ANNA UNIVERSITY CHENNAI : : CHENNAI – 600 025

AFFILIATED INSTITUTIONS

B.TECH. (8 SEMESTER) INFORMATION TECHNOLOGY

CURRICULUM – R 2008

SEMESTER VI

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
IT2351	Network Programming and Management	3	0	0	3
CS2353	Object Oriented Analysis and Design	3	0	0	3
IT2352	Cryptography and Network Security	3	1	0	4
IT2353	Web Technology	3	0	0	3
IT2354	Embedded Systems	3	0	0	3
	Elective I	3	0	0	3
PRACTICAL					
IT2357	Web Technology Lab	0	0	3	2
CS2357	Object Oriented Analysis and Design Lab	0	0	3	2
CS2307	Network Lab	0	0	3	2
	TOTAL	18	1	9	25

SEMESTER VII

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
IT2401	Service Oriented Architecture	3	0	0	3
IT2402	Mobile Communication	3	0	0	3
CS2401	Computer Graphics	3	0	0	3
IT2403	Software Project Management	3	0	0	3
	Elective II	3	0	0	3
	Elective III	3	0	0	3
PRACTICAL					
IT2406	Service Oriented Architecture Lab	0	0	3	2
CS2405	Computer Graphics Lab	0	0	3	2
	TOTAL	18	0	6	22

1

SEMESTER VIII

(Applicable to the students admitted from the Academic year 2008–2009 onwards)

CODE NO.	COURSE TITLE	L	T	P	C
THEORY					
	Elective IV	3	0	0	3
	Elective V	3	0	0	3
PRACTICAL					
IT2451	Project Work	0	0	12	6
	TOTAL	**6**	**0**	**12**	**12**

LIST OF ELECTIVES

SEMESTER VI – Elective I

CODE NO.	COURSE TITLE	L	T	P	C
MA2264	Numerical Methods	3	1	0	4
MA2265	Discrete Mathematics	3	1	0	4
IT2021	Business Process Model	3	0	0	3
IT2022	Software Requirement Engineering	3	0	0	3
IT2023	Digital Image Processing	3	0	0	3
IT2024	User Interface Design	3	0	0	3
CS2022	Visual Programming	3	0	0	3
CS2032	Data Warehousing and Data Mining	3	0	0	3

SEMESTER VII – Elective II

CODE NO.	COURSE TITLE	L	T	P	C
CS2303	Theory of Computation	3	1	0	4
CS2029	Advanced Database Technology	3	0	0	3
IT2031	Electronic Commerce	3	0	0	3
IT2032	Software Testing	3	0	0	3
IT2033	Bio Informatics	3	0	0	3
IT2034	Adhoc Sensor Network	3	0	0	3

SEMESTER VII – Elective III

CODE NO.	COURSE TITLE	L	T	P	C
CS2351	Artificial Intelligence	3	0	0	3
IT2041	Enterprise Resource Planning	3	0	0	3
IT2042	Information Security	3	0	0	3
IT2043	Knowledge Management	3	0	0	3
CS2063	Grid computing	3	0	0	3
CS2041	C# and .NET Framework	3	0	0	3

SEMESTER VIII – Elective IV

CODE NO.	COURSE TITLE	L	T	P	C
IT2050	Principles of Compiler Design	3	0	0	3
IT2051	Knowledge Engineering	3	0	0	3
GE2021	Professional Ethics in Engineering	3	0	0	3
GE2071	Intellectual Property Rights	3	0	0	3
IT2052	Management Information System	3	0	0	3
IT2053	Software Design	3	0	0	3
CS2053	Soft Computing	3	0	0	3

SEMESTER VIII – Elective V

CODE NO.	COURSE TITLE	L	T	P	C
GE2022	Total Quality Management	3	0	0	3
GE2072	Indian Constitution and Society	3	0	0	3
IT2061	System Modeling and Simulation	3	0	0	3
CS2035	Natural Language Processing	3	0	0	3
CS2056	Distributed Systems	3	0	0	3
GE2023	Fundamentals of Nanoscience	3	0	0	3
IT2064	Speech Signal Processing	3	0	0	3

IT2351 **NETWORK PROGRAMMING AND MANAGEMENT** **LT P C**
                                                    3 0 0 3

UNIT I   ELEMENTARY TCP SOCKETS   9
Introduction to Socket Programming – Overview of TCP/IP Protocols –Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.

UNIT II   APPLICATION DEVELOPMENT   9
TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing).

UNIT III   SOCKET OPTIONS, ELEMENTARY UDP SOCKETS   9
Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets – Domain name system – gethostbyname function – Ipv6 support in DNS – gethostbyadr function – getservbyname and getservbyport functions.

UNIT IV   ADVANCED SOCKETS   9
Ipv4 and Ipv6 interoperability – threaded servers – thread creation and termination – TCP echo server using threads – Mutexes – condition variables – raw sockets – raw socket creation – raw socket output – raw socket input – ping program – trace route program.

UNIT V   SIMPLE NETWORK MANAGEMENT   9
SNMP network management concepts – SNMP management information – standard MIB's – SNMPv1 protocol and Practical issues – introduction to RMON, SNMPv2 and SNMPv3.

TOTAL = 45 PERIODS

TEXT BOOKS:
1. W. Richard Stevens, "Unix Network Programming Vol-I", Second Edition, Pearson Education, 1998.
2. Mani Subramaniam, "Network Management: Principles and Practice", Addison Wesley", First Edition, 2001.

REFERENCES:
1. D.E. Comer, "Internetworking with TCP/IP Vol- III", (BSD Sockets Version), Second Edition, Pearson Education, 2003.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2",Third Edition, Addison Wesley, 1999.

CS2353   **OBJECT ORIENTED ANALYSIS AND DESIGN**   **L T P C**
                                                                    3 0 0 3

OBJECTIVES:
*   To learn basic OO analysis and design skills through an elaborate case study.
*   To use the UML design diagrams
*   To apply the appropriate design patterns

UNIT I   **9**
Introduction to OOAD – What is OOAD? – What is UML? What are the United process(UP) phases - Case study – the NextGen POS system, Inception -Use case Modeling - Relating Use cases – include, extend and generalization.

UNIT II   **9**
Elaboration - Domain Models - Finding conceptual classes and description classes – Associations – Attributes – Domain model refinement – Finding conceptual class hierarchies- Aggregation and Composition- UML activity diagrams and modeling

 UNIT III   **9**
System sequence diagrams - Relationship between sequence diagrams and use cases Logical architecture and UML package diagram – Logical architecture refinement - UML class diagrams - UML interaction diagrams

UNIT IV   **9**
GRASP: Designing objects with responsibilities – Creator – Information expert – Low Coupling –Controller – High Cohesion – Designing for visibility - Applying GoF design patterns – adapter, singleton, factory and observer patterns.

UNIT V   **9**
UML state diagrams and modeling - Operation contracts- Mapping design to code -UML deployment and component diagrams

                                                     TOTAL = 45 PERIODS
TEXT BOOK:
1. Craig Larman,"Applying UML and Patterns: An Introduction to object-oriented Analysis and Design and iterative development", Third Edition, Pearson Education, 2005

REFERENCES:
1. Mike O'Docherty, "Object-Oriented Analysis & Design: Understanding System Development with UML 2.0", John Wiley & Sons, 2005.
2. James W- Cooper, Addison-Wesley, "Java Design Patterns – A Tutorial", 2000.
3. Micheal Blaha, James Rambaugh, "Object-Oriented Modeling and Design with UML", Second Edition, Prentice Hall of India Private Limited, 2007
4. Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides,"Design patterns: Elements of Reusable object-oriented software", Addison-Wesley, 1995.

IT2352   **CRYPTOGRAPHY AND NETWORK SECURITY**   **L T P C**
                                                                      3 1 0 4

UNIT I   **9**
Security trends – Attacks and services – Classical crypto systems – Different types of ciphers – LFSR sequences – Basic Number theory – Congruences – Chinese Remainder theorem – Modular exponentiation – Fermat and Euler's theorem – Legendre and Jacobi symbols – Finite fields – continued fractions.

UNIT II   **9**
Simple DES – Differential cryptoanalysis – DES – Modes of operation – Triple DES – AES – RC4 – RSA – Attacks – Primality test – factoring.

UNIT III   **9**
Discrete Logarithms – Computing discrete logs – Diffie-Hellman key exchange – ElGamal Public key cryptosystems – Hash functions – Secure Hash – Birthday attacks - MD5 – Digital signatures – RSA – ElGamal – DSA.

UNIT IV   **9**
Authentication applications – Kerberos, X.509, PKI – Electronic Mail security – PGP, S/MIME – IP security – Web Security – SSL, TLS, SET.

UNIT V   **9**
System security – Intruders – Malicious software – viruses – Firewalls – Security Standards.

TOTAL = 60 PERIODS

TEXT BOOKS:
1. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", 2nd ed, Pearson, 2007.
2. William Stallings, "Crpyptography and Network security Principles and Practices", Pearson/PHI, 4th ed, 2006.

REFERENCES:
1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education, Second Edition, 2007.
2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing Third Edition – Prentice Hall of India, 2006

IT2353   **WEB TECHNOLOGY**   **L T P C**
                                                                              3 0 0 3

UNIT I   **9**
Web Essentials: Clients, Servers, and Communication. The Internet-Basic Internet
Protocols -The World Wide Web-HTTP request message-response message-Web
Clients Web Servers-Case Study. Markup Languages: XHTML. An Introduction to HTML
History-Versions-Basic XHTML Syntax and Semantics-Some Fundamental HTML
Elements-Relative URLs-Lists-tables-Frames-Forms-XML Creating HTML Documents
Case Study.

UNIT II   **9**
Style Sheets: CSS-Introduction to Cascading Style Sheets-Features-Core Syntax-Style
Sheets and HTML Style Rle Cascading and Inheritance-Text Properties-Box Model
Normal Flow Box Layout-Beyond the Normal Flow-Other Properties-Case Study. Client-
Side Programming: The JavaScript Language-History and Versions Introduction
JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-
Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

UNIT III   **9**
Host Objects : Browsers and the DOM-Introduction to the Document Object Model DOM
History and Levels-Intrinsic Event Handling-Modifying Element Style-The Document
Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of
window-Case Study. Server-Side Programming: Java Servlets- Architecture -Overview-A
Servelet-Generating Dynamic Content-Life Cycle-Parameter Data-Sessions-Cookies-
URL Rewriting-Other Capabilities-Data Storage Servelets and Concurrency-Case Study-
Related Technologies.

UNIT IV   **9**
Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration -
Namespaces JavaScript and XML: Ajax-DOM based XML processing Event-oriented
Parsing: SAX-Transforming XML Documents-Selecting XML Data:XPATH-Template-
based Transformations: XSLT-Displaying XML Documments in Browsers-Case Study-
Related Technologies. Separating Programming and Presentation: JSP Technology
Introduction-JSP and Servlets-Running JSP Applications Basic JSP-JavaBeans Classes
and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm-Case
Study-Related Technologies.

UNIT V   **9**
Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web
Service Client-Describing Web Services: WSDL- Representing Data Types: XML
Schema-Communicating Object Data: SOAP Related Technologies-Software
Installation-Storing Java Objects as Files-Databases and Java Servlets.

TOTAL = 45 PERIODS
TEXT BOOK:
1. Jeffrey C.Jackson, "Web Technologies--A Computer Science Perspective", Pearson
   Education, 2006.

REFERENCES:
1. Robert. W. Sebesta, "Programming the World Wide Web", Fourth Edition, Pearson Education, 2007.
2. Deitel, Deitel, Goldberg, "Internet & World Wide Web How To Program", Third Edition, Pearson Education, 2006.
3. Marty Hall and Larry Brown,"Core Web Programming" Second Edition, Volume I and II, Pearson Education, 2001.
4. Bates, "Developing Web Applications", Wiley, 2006.

IT2354	EMBEDDED SYSTEMS	L T P C
		3 0 0 3

UNIT I   EMBEDDED COMPUTING   9
Challenges of Embedded Systems – Embedded system design process. Embedded processors – 8051 Microcontroller, ARM processor – Architecture, Instruction sets and programming.

UNIT II   MEMORY AND INPUT / OUTPUT MANAGEMENT   9
Programming Input and Output – Memory system mechanisms – Memory and I/O devices and interfacing – Interrupts handling.

UNIT III   PROCESSES AND OPERATING SYSTEMS   9
Multiple tasks and processes – Context switching – Scheduling policies – Interprocess communication mechanisms – Performance issues.

UNIT IV   EMBEDDED SOFTWARE   9
Programming embedded systems in assembly and C – Meeting real time constraints – Multi-state systems and function sequences. Embedded software development tools – Emulators and debuggers.

UNIT V   EMBEDDED SYSTEM DEVELOPMENT   9
Design issues and techniques – Case studies – Complete design of example embedded systems.

                                                                TOTAL = 45 PERIODS

TEXT BOOKS:
1. Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
2. Michael J. Pont, "Embedded C", Pearson Education , 2007.

REFERENCES:
1. Steve Heath, "Embedded System Design", Elsevier, 2005.
2. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second edition, 2007.

IT2357   **WEB TECHNOLOGY LAB**   **L T P C**
                                                                       0 0 3 2

LIST OF EXPERIMENTS

1. Create a web page with the following using HTML
   - i)   To embed an image map in a web page
   - ii)   To fix the hot spots
   - iii)   Show all the related information when the hot spots are clicked.

2. Create a web page with all types of Cascading style sheets.
3. Client Side Scripts for Validating Web Form Controls using DHTML
4. Write programs in Java to create applets incorporating the following features:
   - Create a color palette with matrix of buttons
   - Set background and foreground of the control text area by selecting a color from color palette.
   - In order to select Foreground or background use check box control as radio buttons
   - To set background images
5. Write programs in Java using Servlets:
   - To invoke servlets from HTML forms
   - To invoke servlets from Applets
6. Write programs in Java to create three-tier applications using JSP and Databases
   - for conducting on-line examination.
   - for displaying student mark list. Assume that student information is available in a database which has been stored in a database server.
7. Programs using XML – Schema – XSLT/XSL
8. Program using DOM / SAX
9. Programs using AJAX
10. Consider a case where we have two web Services- an airline service and a travel agent and the travel agent is searching for an airline. Implement this scenario using Web Services and Data base.

TOTAL = 45 PERIODS

Requirement for a batch of 30 students

S. No.	Description of Equipment	Quantity Required
1.	**Hardware:** Pentium IV with 2 GB RAM, 160 GB HARD Disk, Monitor 1024 x 768 colour 60 Hz.	30 Nodes
2.	**Software:** Windows /Linux operating system JDK 1.6(or above) AJAX Oracle 9i(or above version) / Microsoft access	30 user license

CS2357   OBJECT ORIENTED ANALYSIS AND DESIGN LAB   L T P C
                                                                    0 0 3 2

OBJECTIVE:
To develop a mini-project following the 12 exercises listed below.
1. To develop a problem statement.
2. Develop an IEEE standard SRS document. Also develop risk management and project plan (Gantt chart).
3. Identify Use Cases and develop the Use Case model.
4. Identify the business activities and develop an UML Activity diagram.
5. Identity the conceptual classes and develop a domain model with UML Class diagram.
6. Using the identified scenarios find the interaction between objects and represent them using UML Interaction diagrams.
7. Draw the State Chart diagram.
8. Identify the User Interface, Domain objects, and Technical services. Draw the partial layered, logical architecture diagram with UML package diagram notation.
9. Implement the Technical services layer.
10. Implement the Domain objects layer.
11. Implement the User Interface layer.
12. Draw Component and Deployment diagrams.

                                                        TOTAL = 45 PERIODS
Suggested domains for Mini-project.
1. Passport automation system.
2. Book bank
3. Exam Registration
4. Stock maintenance system.
5. Online course reservation system
6. E-ticketing
7. Software personnel management system
8. Credit card processing
9. e-book management system
10. Recruitment system
11. Foreign trading system
12. Conference Management System
13. BPO Management System

Suggested Software Tools
ArgoUML, Eclipse IDE, Visual Paradigm, Visual case, and Rational Suite

Requirement for a batch of 30 students

S. No.	Description of Equipment	Quantity Required
1.	*Software Tools* ArgoUML, Eclipse IDE, Visual Paradigm, Visual case, and Rational Suite	30 user License
2.	PC's	30

CS2307   **NETWORK LAB**   **L T P C**
                                                                        0 0 3 2

1. Programs using TCP Sockets (like date and time server & client, echo server & client, etc..)
2. Programs using UDP Sockets (like simple DNS)
3. Programs using Raw sockets (like packet capturing and filtering)
4. Programs using RPC
5. Simulation of sliding window protocols
   Experiments using simulators (like OPNET)
6. Performance comparison of MAC protocols
7. Implementing Routing Protocols
8. Performance comparison of Routing protocols
9. Study of UDP performance
10. Study of TCP performance.

TOTAL = 45 PERIODS

Requirement for a batch of 30 students

S.No.	Description of Equipment	Quantity required

1.	SOFTWARE
	  ➤ C++ Compiler
	  ➤ J2SDK (freeware)
	  ➤ Linux
	  ➤ NS2/Glomosim/OPNET
	      (Freeware)
		30

2.	Hardware ➤ PCs	30 Nos.

IT2401   **SERVICE ORIENTED ARCHITECTURE**   **L T P C**
                                                                                3 0 0 3

OBJECTIVES:
- To gain understanding of the basic principles of service orientation
- To learn service oriented analysis techniques
- To learn technology underlying the service design
- To learn advanced concepts such as service composition, orchestration and Choreography
- To know about various WS-* specification standards

UNIT I   **9**
Roots of SOA – Characteristics of SOA - Comparing SOA to client-server and distributed internet architectures – Anatomy of SOA- How components in an SOA interrelate - Principles of service orientation

UNIT II   **9**
Web services – Service descriptions – Messaging with SOAP –Message exchange Patterns – Coordination –Atomic Transactions – Business activities – Orchestration – Choreography - Service layer abstraction – Application Service Layer – Business Service Layer – Orchestration Service Layer

UNIT III   **9**
Service oriented analysis – Business-centric SOA – Deriving business services- service modeling - Service Oriented Design – WSDL basics – SOAP basics – SOA composition guidelines – Entity-centric business service design – Application service design – Task-centric business service design

UNIT IV   **9**
SOA platform basics – SOA support in J2EE – Java API for XML-based web services (JAX-WS) - Java architecture for XML binding (JAXB) – Java API for XML Registries (JAXR) - Java API for XML based RPC (JAX-RPC)- Web Services Interoperability Technologies (WSIT) - SOA support in .NET – Common Language Runtime - ASP.NET web forms – ASP.NET web services – Web Services Enhancements (WSE)

UNIT V   **9**
WS-BPEL basics – WS-Coordination overview - WS-Choreography, WS-Policy, WS-Security
                                                                        TOTAL = 45 PERIODS

TEXT BOOKS:
1. Thomas Erl**, "**Service-Oriented Architecture: Concepts, Technology, and Design", Pearson Education, 2005.

REFERENCES:
1. Thomas Erl, "SOA Principles of Service Design "(The Prentice Hall Service-Oriented Computing Series from Thomas Erl), 2005.
2. Newcomer, Lomow, "Understanding SOA with Web Services", Pearson Education, 2005.
3. Sandeep Chatterjee, James Webber, "Developing Enterprise Web Services, An Architect's Guide", Pearson Education, 2005.
4. Dan Woods and Thomas Mattern, "Enterprise SOA Designing IT for Business Innovation" O'REILLY, First Edition, 2006

IT2402   **MOBILE COMMUNICATION**   **L T P C**
                                                                     3 0 0 3

UNIT I   WIRELESS COMMUNICATION   7
Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA – TDMA – CDMA – Cellular Wireless Networks

UNIT II   WIRELESS NETWORKS   9
Wireless LAN – IEEE 802.11 Standards – Architecture – Services – Mobile Ad hoc Networks- WiFi and WiMAX - Wireless Local Loop

UNIT III   MOBILE COMMUNICATION SYSTEMS   11
GSM-architecture-Location tracking and call setup- Mobility management- Handover-Security-GSM SMS –International roaming for GSM- call recording functions-subscriber and service data mgt –-Mobile Number portability -VoIP service for Mobile Networks – GPRS –Architecture-GPRS procedures-attach and detach procedures-PDP context procedure-combined RA/LA update procedures-Billing

UNIT IV   MOBILE NETWORK AND TRANSPORT LAYERS   9
Mobile IP – Dynamic Host Configuration Protocol-Mobile Ad Hoc Routing Protocols–Multicast routing-TCP over Wireless Networks – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit / Fast Recovery – Transmission/Timeout Freezing-Selective Retransmission – Transaction Oriented TCP- TCP over 2.5 / 3G wireless Networks

UNIT V   APPLICATION LAYER   9
WAP Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile- caching model-wireless bearers for WAP - WML – WMLScripts - WTA - iMode- SyncML.

                                        TOTAL = 45 PERIODS

TEXT BOOKS:
1. Jochen Schiller, "Mobile Communications", Second Edition, Pearson Education, 2003.
2. William Stallings, "Wireless Communications and Networks", Pearson Education, 2002.

REFERENCES:
1. Kaveh Pahlavan, Prasanth Krishnamoorthy, "Principles of Wireless Networks", First Edition, Pearson Education, 2003.
2. Uwe Hansmann, Lothar Merk, Martin S. Nicklons and Thomas Stober, "Principles of Mobile Computing", Springer, 2003.
3. C.K.Toh, "AdHoc Mobile Wireless Networks", First Edition, Pearson Education, 2002.

CS2401   **COMPUTER GRAPHICS**   **L T P C**
                                                                                   3 0 0 3

UNIT I   2D PRIMITIVES   9
Output primitives – Line, Circle and Ellipse drawing algorithms - Attributes of output primitives – Two dimensional Geometric transformation - Two dimensional viewing – Line, Polygon, Curve and Text clipping algorithms

UNIT II   3D CONCEPTS   9
Parallel and Perspective projections - Three dimensional object representation – Polygons, Curved lines, Splines, Quadric Surfaces,- Visualization of data sets - 3D transformations – Viewing -Visible surface identification.

UNIT III   GRAPHICS PROGRAMMING   9
Color Models – RGB, YIQ, CMY, HSV – Animations – General Computer Animation, Raster, Keyframe - Graphics programming using OPENGL – Basic graphics primitives – Drawing three dimensional objects - Drawing three dimensional scenes

UNIT IV   RENDERING   9
Introduction to Shading models – Flat and Smooth shading – Adding texture to faces – Adding shadows of objects – Building a camera in a program – Creating shaded objects – Rendering texture – Drawing Shadows.

UNIT V   FRACTALS   9
Fractals and Self similarity – Peano curves – Creating image by iterated functions – Mandelbrot sets – Julia Sets – Random Fractals – Overview of Ray Tracing – Intersecting rays with other primitives – Adding Surface texture – Reflections and Transparency – Boolean operations on Objects

                                                                    TOTAL = 45 PERIODS
TEXT BOOKS:
1. Donald Hearn, Pauline Baker, Computer Graphics – C Version, second edition, Pearson Education,2004.
2. F.S. Hill, Computer Graphics using OPENGL, Second edition, Pearson Education,2003.

REFERENCE:
1. James D. Foley, Andries Van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics- Principles and practice, Second Edition in C, Pearson Education, 2007.

IT2403   **SOFTWARE PROJECT MANAGEMENT**   **L T P C**
                                                                                   3 0 0 3
UNIT I   INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT   9
Project Definition – Contract Management – Activities Covered By Software Project Management – Overview Of Project Planning – Stepwise Project Planning.

UNIT II   PROJECT EVALUATION   9
Strategic Assessment – Technical Assessment – Cost Benefit Analysis –Cash Flow Forecasting – Cost Benefit Evaluation Techniques – Risk Evaluation.

UNIT III   ACTIVITY PLANNING   9

Objectives – Project Schedule – Sequencing and Scheduling Activities –Network Planning Models – Forward Pass – Backward Pass – Activity Float – Shortening Project Duration – Activity on Arrow Networks – Risk Management – Nature Of Risk – Types Of Risk – Managing Risk – Hazard Identification – Hazard Analysis – Risk Planning And Control.

UNIT IV   MONITORING AND CONTROL   9

Creating Framework – Collecting The Data – Visualizing Progress – Cost Monitoring – Earned Value – Priortizing Monitoring – Getting Project Back To Target – Change Control – Managing Contracts – Introduction – Types Of Contract – Stages In Contract Placement – Typical Terms Of A Contract – Contract Management – Acceptance.

UNIT V   MANAGING PEOPLE AND ORGANIZING TEAMS   9

Introduction – Understanding Behavior – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction In The Best Methods – Motivation – The Oldman – Hackman Job Characteristics Model – Working In Groups – Becoming A Team –Decision Making – Leadership – Organizational Structures – Stress –Health And Safety – Case Studies.

<div align="right">TOTAL = 45 PERIODS</div>

TEXT BOOK:
1. Bob Hughes, Mikecotterell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

REFERENCES:
1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Manangement in Practive", Pearson Education, 2002.

IT2406   SERVICE ORIENTED ARCHITECTURE LAB   L T P C
<div align="right">0 0 3 2</div>

1. Develop at least 5 components such as Order Processing, Payment Processing, etc., using .NET component technology.
2. Develop at least 5 components such as Order Processing, Payment Processing, etc., using EJB component technology.
3. Invoke .NET components as web services.
4. Invoke EJB components as web services.
5. Develop a Service Orchestration Engine (workflow) using WS-BPEL and implement service composition. For example, a business process for planning business travels will invoke several services. This process will invoke several airline companies (such as American Airlines, Delta Airlines etc.) to check the airfare price and buy at the lowest price.
6. Develop a J2EE client to access a .NET web service.
7. Develop a .NET client to access a J2EE web service.

<div align="right">TOTAL = 45 PERIODS</div>

LIST OF EQUIPMENTS:
Hardware:
　　　CPU:- (As Server) Processor (Core 2 Quad or equivalent) with good speed, 2GBRAM, 300GBHDD
Software:
1).NET framework (MS Academic Alliance)
　　　 (or)
　 Express Edition
2) J2EE framework free download
3) OS – Windows or Linux

CS2405　　　　　　**COMPUTER GRAPHICS LAB**　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　0 0 3 2

1. Implementation of Bresenhams Algorithm – Line, Circle, Ellipse.
2. Implementation of Line, Circle and ellipse Attributes.
3. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
4. Composite 2D Transformations.
5. Cohen Sutherland 2D line clipping and Windowing
6. Sutherland – Hodgeman Polygon clipping Algorithm.
7. Three dimensional transformations - Translation, Rotation, Scaling.
8. Composite 3D transformations.
9. Drawing three dimensional objects and Scenes.
10. Generating Fractal images.

　　　　　　　　　　　　　　　　　　　TOTAL = 45 PERIODS

LIST OF EQUIPMENTS:
1) Turbo C
2) Visual C++ with OPENGL
3) Any 3D animation software like 3DSMAX, Maya, Blender

MA2264　　　　　　　**NUMERICAL METHODS**　　　　　　**L T P C**
　　　　　　　　　　　　　　　　　　　　　　　　　　　　　3 1 0 4
UNIT I　　　**SOLUTION OF EQUATIONS AND EIGENVALUE PROBLEMS**　　　**9**
Solution of equation –Fixed point iteration: $x=g(x)$ method - Newton's method – Solution of linear system by Gaussian elimination and Gauss-Jordon method– Iterative method - Gauss-Seidel method - Inverse of a matrix by Gauss Jordon method – Eigen value of a matrix by power method and by Jacobi method for symmetric matrix.

UNIT II　　　**INTERPOLATION AND APPROXIMATION**　　　　　　　　**9**
Lagrangian Polynomials – Divided differences – Interpolating with a cubic spline – Newton's forward and backward difference formulas.

UNIT III　　　**NUMERICAL DIFFERENTIATION AND INTEGRATION**　　　**9**
Differentiation using interpolation formulae –Numerical integration by trapezoidal and Simpson's 1/3 and 3/8 rules – Romberg's method – Two and Three point Gaussian quadrature formulae – Double integrals using trapezoidal and Simpsons's rules.

**UNIT IV   INITIAL VALUE PROBLEMS FOR ORDINARY DIFFERENTIAL
                EQUATIONS   9**
Single step methods: Taylor series method – Euler method for first order equation –
Fourth order Runge – Kutta method for solving first and second order equations –
Multistep methods: Milne's and Adam's predictor and corrector methods.

**UNIT V   BOUNDARY VALUE PROBLEMS IN ORDINARY AND PARTIAL
                DIFFERENTIAL EQUATIONS   9**
Finite difference solution of second order ordinary differential equation – Finite difference
solution of one dimensional heat equation by explicit and implicit methods – One
dimensional wave equation and two dimensional Laplace and Poisson equations.

                                                L : 45 , T : 15 ,TOTAL = 60 PERIODS
TEXT BOOKS:
1. Veerarjan, T and Ramachandran, T. 'Numerical methods with programming in 'C'
   Second Editiion, Tata McGraw-Hill Publishing.Co.Ltd. (2007).
2. Sankara Rao K, 'Numerical Methods for Scientisits and Engineers' – 3rd editiion
   Printice Hall of India Private Ltd, New Delhi, (2007).

REFERENCES:
1. Chapra, S. C and Canale, R. P. "Numerical Methods for Engineers", 5th Edition, Tata
   McGraw-Hill, New Delhi, 2007.
2. Gerald, C. F. and Wheatley, P.O., "Applied Numerical Analysis", 6th Edition, Pearson
   Education Asia, New Delhi, 2006.
3. Grewal, B.S. and Grewal,J.S., " Numerical methods in Engineering and Science", 6th
   Edition, Khanna Publishers, New Delhi, 2004

          **MA2265   DISCRETE MATHEMATICS   L T P C
                                                                            3 1 0 4**

UNIT I   LOGIC AND PROOFS   9 + 3
Propositional Logic – Propositional equivalences-Predicates and quantifiers-Nested
Quantifiers-Rules of inference-introduction to Proofs-Proof Methods and strategy

UNIT II   COMBINATORICS   9+3
Mathematical inductions-Strong induction and well ordering-.The basics of counting-The
pigeonhole principle –Permutations and combinations-Recurrence relations-Solving
Linear recurrence relations-generating functions-inclusion and exclusion and
applications.

UNIT III   GRAPHS   9 + 3
Graphs and graph models-Graph terminology and special types of graphs-Representing
graphs and graph isomorphism-connectivity-Euler and Hamilton paths

 UNIT IV   ALGEBRAIC STRUCTURES   9 + 3
Algebraic systems-Semi groups and monoids-Groups-Subgroups and homomorphisms-
Cosets and Lagrange's theorem- Ring & Fields (Definitions and examples)

UNIT V   LATTICES AND BOOLEAN ALGEBRA   9+3

Partial ordering-Posets-Lattices as Posets- Properties of lattices-Lattices as Algebraic systems –Sub lattices –direct product and Homomorphism-Some Special lattices-Boolean Algebra

TOTAL: 60 PERIODS

TEXT BOOKS:

1. Kenneth H.Rosen, *"Discrete Mathematics and its Applications"*, Special Indian edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, (2007). (*For the units 1 to 3, Sections 1.1 to 1.7 , 4.1 & 4.2, 5.1 to 5.3, 6.1, 6.2, 6.4 to 6.6, 8.1 to 8.5)*
2. Trembly J.P and Manohar R, *"Discrete Mathematical Structures with Applications to Computer Science"*, Tata McGraw–Hill Pub. Co. Ltd, New Delhi, 30th Re-print (2007).*(For units 4 & 5 , Sections 2-3.8 & 2-3.9,3-1,3-2 & 3-5, 4-1 & 4-2)*

REFERENCES:

1. Ralph. P. Grimaldi, "*Discrete and Combinatorial Mathematics: An Applied Introduction"*, Fourth Edition, Pearson Education Asia, Delhi, (2002).
2. Thomas Koshy, *"Discrete Mathematics with Applications"*, Elsevier Publications, (2006).
3. Seymour Lipschutz and Mark Lipson, "*Discrete Mathematics"*, Schaum's Outlines, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, Second edition, (2007).

IT2021   BUSINESS PROCESS MODEL   L T P C
                                                                     3 0 0 3

UNIT I   ORGANIZATIONAL STRUCTURE   9

Types of Business Organizations-Organizational Structures-Definition-Complexity-Formulization-Size-Technology-Culture-Forms and Outcomes-Explanations of Structures-IT Industry and Organizational Structures-Processes of organizations-Case Studies

UNIT II   PROCESS FLOW MEASUREMENT   9

Process flow measures - flow rate - flow time - inventory - flow-time analysis - process flow chart - flow-time measurement - CPM - managing flow-time - flow-rate and capacity analysis - resources and resource pools - flow-rate measurement - process capacity - inventory analysis

UNIT III   PROCESS FLOW VARIABILITY   9

Managing flow variability - safety inventory - demand forecasts and forecast errors - optimal services level - lead time demand variability - safety capacity - service processes and performance measures - queueing process - buffer capacity - synchronization and capacity and demand - process control and capability - performance variability - process capability measurement and improvement - product and process design - process synchronization and improvement

UNIT IV   BUSINESS PROCESS REENGINEERING   9

Introduction to Business Process Re-engineering (BPR)-Meaning-Types-Process-Impetrative for Survival-Strategic Approach-Implementing Business Process Re-engineering-Methodology and Steps-Indian Scenario of Implementing BPR-Case Studies

UNIT V   BPR AND IT INDUSTRY   9
BPR and Information Technology Process-People View and Perspectives-Empowering People through IT-Managing Change in the Global Environment-BPR Rediscovering Indian Paradigm-Need of Reengineering-Case Studies

                                                                      TOTAL = 45 PERIODS

TEXTBOOKS:
1. Richard H.Hall, "Organizations - Structures, Processes and Outcomes", Pearson Education, 2004
2. Ravi Anupindi et. al., "Managing Business Process Flows", Pearson Education, 1999.
3. M.S.Jayaraman et. al, "Business Process Reengineering", Tata Mc Graw Hill Publications, 2001

REFERENCES:

1. Gareth Jones, "Organizational Theory, Design and Change", Pearson Education, 4th Edition, 2004
2. John Jeston and Johan Nelis, "Business Process Management", Elsevier, 2006.

IT2022   SOFTWARE REQUIREMENT ENGINEERING   L T P C
                                                          3 0 0 3
UNIT I   INTRODUCTION   9
Introduction - Requirements Problem – Requirements management – Requirements and software life cycle-software team.

UNIT II   ANALYSING THE PROLEM   9
The five steps in problem analysis– business modeling – Systems engineering of software intensive systems – Understanding user and stakeholders needs – Features of a product or system –Interviewing – Requirements workshops- Brain storming and Idea reduction- storyboarding

UNIT III   DEFINING THE SYSTEM   9
Use case primer-Organizing requirement Information-Vision Document-Product Management-Managing scope-Establishing Project scope-Managing customer

UNIT IV   REFINING THE SYSTEM DEFINITION   9
Software requirement-Refining the use cases-developing the supplementary specification- Ambiguity and specificity -Technical methods for specifying requirements

UNIT V   BUILDING THE RIGHT SYSTEM   9
From use cases to Implementation-From use Cases to Test cases-Tracing requirements-Managing Change-Assessing Requirements Quality in Iterative Development-Agile Requirement methods.
                                                                      TOTAL = 45 PERIODS
TEXT BOOK:
1. Leffingwell, D., Widrig, D., "Managing Software Requirements A Use case approach", Second Edition, Pearson Education, 2003.

REFERENCES:
1. Swapna Kishore, Rajesh Naik, "Software Requirements and Estimation", Tata McGraw Hill, 2001
2. K.Weigers, Software Requirements, Microsoft Press, 1999.
3. Ian Sommerville and P Sawyer, "Requirements engineering a good practice Guide", Wiley India, 1997

IT2023   **DIGITAL IMAGE PROCESSING**   **L T P C**
                                                    3 0 0 3

UNIT I   FUNDAMENTALS OF IMAGE PROCESSING   9
Introduction – Steps in Image Processing Systems – Image Acquisition – Sampling and Quantization – Pixel Relationships – Colour Fundamentals and Models, File Formats, Image operations – Arithmetic, Geometric and Morphological.

UNIT II   IMAGE ENHANCEMENT   9
Spatial Domain Gray level Transformations Histogram Processing Spatial Filtering – Smoothing and Sharpening. Frequency Domain : Filtering in Frequency Domain – DFT, FFT, DCT – Smoothing and Sharpening filters – Homomorphic Filtering.

UNIT III   IMAGE SEGMENTATION AND FEATURE ANALYSIS   9
Detection of Discontinuities – Edge Operators – Edge Linking and Boundary Detection – Thresholding – Region Based Segmentation – Morphological WaterSheds – Motion Segmentation, Feature Analysis and Extraction.

UNIT IV   MULTI RESOLUTION ANALYSIS AND COMPRESSIONS   9
Multi Resolution Analysis : Image Pyramids – Multi resolution expansion – Wavelet Transforms.
Image Compression : Fundamentals – Models – Elements of Information Theory – Error Free Compression – Lossy Compression – Compression Standards.

UNIT V   APPLICATIONS OF IMAGE PROCESSING   9
Image Classification – Image Recognition – Image Understanding – Video Motion Analysis – Image Fusion – Steganography – Digital Compositing – Mosaics – Colour Image Processing..

TOTAL = 45 PERIODS

TEXT BOOKS :
1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing" Second Edition, Pearson Education, 2003.

REFERENCES:
1. Milan Sonka, Vaclav Hlavac and Roger Boyle, "Image Processing, Analysis and Machine Vision", Second Edition, Thomson Learning, 2001
2. Anil K.Jain, "Fundamentals of Digital Image Processing", PHI, 2006.
3. Sanjit K. Mitra, & Giovanni L. Sicuranza, "Non Linear Image Processing", Elsevier, 2007.
4. Richard O. Duda, Peter E. HOF, David G. Stork, "Pattern Classification" Wiley Student Edition, 2006.

IT2024   **USER INTERFACE DESIGN**   **L T P C**
                                                  3 0 0 3

UNIT I   **INTRODUCTION**   **8**
Human–Computer Interface – Characteristics Of Graphics Interface –Direct Manipulation Graphical System – Web User Interface –Popularity –Characteristic & Principles.

UNIT II   **HUMAN COMPUTER INTERACTION**   **10**
User Interface Design Process – Obstacles –Usability –Human Characteristics In Design – Human Interaction Speed –Business Functions –Requirement Analysis – Direct – Indirect Methods – Basic Business Functions – Design Standards – System Timings – Human Consideration In Screen Design – Structures Of Menus – Functions Of Menus– Contents Of Menu– Formatting – Phrasing The Menu – Selecting Menu Choice– Navigating Menus– Graphical Menus.

UNIT III   **WINDOWS**   **9**
Characteristics– Components– Presentation Styles– Types– Managements– Organizations– Operations– Web Systems– Device– Based Controls Characteristics– Screen – Based Controls – Operate Control – Text Boxes– Selection Control– Combination Control– Custom Control– Presentation Control.

UNIT IV   **MULTIMEDIA**   **9**
Text For Web Pages – Effective Feedback– Guidance & Assistance– Internationalization– Accesssibility– Icons– Image– Multimedia – Coloring.

UNIT V   **WINDOWS LAYOUT– TEST**   **9**
Prototypes – Kinds Of Tests – Retest – Information Search – Visualization – Hypermedia – WWW– Software Tools.

                                                TOTAL = 45 PERIODS

TEXT BOOKS:
1. Wilbent. O. Galitz ,"The Essential Guide To User Interface Design", John Wiley& Sons, 2001.
2. Ben Sheiderman, "Design The User Interface", Pearson Education, 1998.

REFERENCES:
1. Alan Cooper, "The Essential Of User Interface Design", Wiley – Dream Tech Ltd., 2002.

CS2022   **VISUAL PROGRAMMING**   **L T P C**
                                                    3 0 0 3

UNIT I   **9**
Windows Programming Fundamentals – MFC – Windows – Graphics – Menus – Mouse and keyboard – Bitmaps – Palettes – Device-Independent Bitmaps

UNIT II   **9**
Controls – Modal and Modeless Dialog – Property – Data I/O – Sound – Timer

UNIT III   **9**
Memory management – SDI – MDI – MFC for Advanced windows user Interface – status bar and Toolbars – Tree view – List view – Threads

UNIT IV 9

ODBC – MFC Database classes – DAO - DLLs – Working with Images

UNIT V 9

COM Fundamentals – ActiveX control – ATL – Internet Programming

TOTAL = 45 PERIODS

TEXT BOOK:

1. Richard C.Leinecker and Tom Archer, "Visual C++ 6 Programming Bible", Wiley DreamTech Press, 2006.

REFERENCES:

1. Lars Klander, "Core Visual C++ 6", Pearson Education, 2000
2. Deital, Deital, Liperi and Yaeger "Visual V++ .NET How to Program" , Pearson Education, 2004.

CS2032   **DATA WAREHOUSING AND DATA MINING**   **LT P C**
3 0 0 3

UNIT I   **DATA WAREHOUSING**   10

Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

UNIT II   **BUSINESS ANALYSIS**   8

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools – OLAP Tools and the Internet.

UNIT III   **DATA MINING**   8

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns – Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse – Issues –Data Preprocessing.

UNIT IV   **ASSOCIATION RULE MINING AND CLASSIFICATION**   11

Mining Frequent Patterns, Associations and Correlations – Mining Methods – Mining Various Kinds of Association Rules – Correlation Analysis – Constraint Based Association Mining – Classification and Prediction - Basic Concepts - Decision Tree Induction - Bayesian Classification – Rule Based Classification – Classification by Backpropagation – Support Vector Machines – Associative Classification – Lazy Learners – Other Classification Methods - Prediction

UNIT V   **CLUSTERING AND APPLICATIONS AND TRENDS IN DATA MINING 8**

Cluster Analysis - Types of Data – Categorization of Major Clustering Methods - K-means – Partitioning Methods – Hierarchical Methods - Density-Based Methods –Grid Based Methods – Model-Based Clustering Methods – Clustering High Dimensional Data - Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TOTAL = 45 PERIODS

TEXT BOOKS:
1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and Micheline Kamber, "Data Mining Concepts and Techniques", Second Edition, Elsevier, 2007.

REFERENCES:
1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, " Introduction To Data Mining", Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay ", Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, " Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Inter science, 2006.

CS2303	THEORY OF COMPUTATION	L T P C
		3 1 0 4

UNIT I   AUTOMATA   9 + 3
Introduction to formal proof – Additional forms of proof – Inductive proofs –Finite Automata (FA) – Deterministic Finite Automata (DFA) – Non-deterministic Finite Automata (NFA) – Finite Automata with Epsilon transitions.

UNIT II   REGULAR EXPRESSIONS AND LANGUAGES   9 + 3
Regular Expression – FA and Regular Expressions – Proving languages not to be regular – Closure properties of regular languages – Equivalence and minimization of Automata.

UNIT III   CONTEXT-FREE GRAMMARS AND LANGUAGES   9 + 3
Context-Free Grammar (CFG) – Parse Trees – Ambiguity in grammars and languages – Definition of the Pushdown automata – Languages of a Pushdown Automata – Equivalence of Pushdown automata and CFG– Deterministic Pushdown Automata.

UNIT IV   PROPERTIES OF CONTEXT-FREE LANGUAGES   9 + 3
Normal forms for CFG – Pumping Lemma for CFL – Closure Properties of CFL – Turing Machines – Programming Techniques for TM.

UNIT V   UNDECIDABALITY   9 + 3
A language that is not Recursively Enumerable (RE) – An undecidable problem that is RE – Undecidable problems about Turing Machine – Post's Correspondence Problem – The classes P and NP

L: 45 T:15 TOTAL = 60 PERIODS

TEXT BOOKS:
1. J.E. Hopcroft, R. Motwani and J.D. Ullman, "Introduction to Automata Theory, Languages and Computations", second Edition, Pearson Education, 2007.

REFERENCES:
1. H.R. Lewis and C.H. Papadimitriou, "Elements of the theory of Computation", Second Edition, Pearson Education, 2003.

2. Thomas A. Sudkamp," An Introduction to the Theory of Computer Science, Languages and Machines", Third Edition, Pearson Education, 2007.
3. Raymond Greenlaw an H.James Hoover, " Fundamentals of Theory of Computation, Principles and Practice", Morgan Kaufmann Publishers, 1998.
4. Micheal Sipser, "Introduction of the Theory and Computation", Thomson Brokecole, 1997.
5. J. Martin,"Introduction to Languages and the Theory of computation", 3rd Edition,Tata Mc Graw Hill, 2007

CS2029   ADVANCED DATABASE TECHNOLOGY   L T P C
**   3 0 0 3**

UNIT I   RELATIONAL MODEL ISSUES   9
ER Model - Normalization – Query Processing – Query Optimization - Transaction Processing - Concurrency Control – Recovery - Database Tuning**.**

UNIT II   DISTRIBUTED DATABASES   9
Parallel Databases – Inter and Intra Query Parallelism – Distributed Database Features – Distributed Database Architecture – Fragmentation – Distributed Query Processing – Distributed Transactions Processing – Concurrency Control – Recovery – Commit Protocols.

UNIT III   OBJECT ORIENTED DATABASES   9
Introduction to Object Oriented Data Bases - Approaches - Modeling and Design - Persistence – Query Languages - Transaction - Concurrency – Multi Version Locks – Recovery – POSTGRES – JASMINE –GEMSTONE - ODMG Model.

UNIT IV   EMERGING SYSTEMS   9
Enhanced Data Models - Client/Server Model - Data Warehousing and Data Mining - Web Databases – Mobile Databases- XML and Web Databases.

UNIT V   CURRENT ISSUES   9
Rules - Knowledge Bases - Active and Deductive Databases - Multimedia Databases– Multimedia Data Structures – Multimedia Query languages - Spatial Databases.

TOTAL = 45 PERIODS

TEXT BOOK:
1. Thomas Connolly and Carlolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education 2003.

REFERENCES:
1. R. Elmasri, S.B. Navathe, "Fundamentals of Database Systems", Fifth Edition, Pearson Education, 2006.
2. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Fifth Edition, Tata McGraw Hill, 2006.
3. C.J.Date, A.Kannan, S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.

IT2031   **ELECTRONIC COMMERCE**   **L T P C**
                                                                   3 0 0 3

UNIT I   INTRODUCTION   9
Traditional commerce and E commerce – Internet and WWW – role of WWW – value chains – strategic business and Industry value chains – role of E commerce.

UNIT II   INFRASTRUCTURE FOR E COMMERCE   9
Packet switched networks – TCP/IP protocol script – Internet utility programmes – SGML, HTML and XML – web client and servers – Web client/server architecture – intranet and extranets.

UNIT III   WEB BASED TOOLS FOR E COMMERCE   9
Web server – performance evaluation - web server software feature sets – web server software and tools – web protocol – search engines – intelligent agents –EC software – web hosting – cost analysis

UNIT IV   SECURITY   9
Computer security classification – copy right and Intellectual property – electronic commerce threats – protecting client computers – electronic payment systems – electronic cash – strategies for marketing – sales and promotion – cryptography – authentication.

UNIT V   INTELLIGENT AGENTS   9
Definition and capabilities – limitation of agents – security – web based marketing – search engines and Directory registration – online advertisements – Portables and info mechanics – website design issues.

                                                    TOTAL = 45 PERIODS

TEXT BOOKS:
1. Ravi Kalakota, " Electronic Commerce", Pearson Education,
2. Gary P Schneider "Electronic commerce", Thomson learning & James T Peny Cambridge USA, 2001.
3. Manlyn Greenstein and Miklos "Electronic commerce" McGraw-Hill, 2002.

REFERENCES:
1. Efraim Turvan J.Lee, David kug and chung, "Electronic commerce" Pearson Education Asia 2001.
2. Brenda Kienew E commerce Business Prentice Hall, 2001.

IT2032   **SOFTWARE TESTING**   **L T P C**
                                                                   3 0 0 3

UNIT I   INTRODUCTION   9
Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester's Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.

UNIT II   TEST CASE DESIGN   9

Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing – Requirements based testing – positive and negative testing –– Boundary Value Analysis – decision tables - Equivalence Class Partitioning state-based testing– cause-effect graphing – error guessing - compatibility testing – user documentation testing – domain testing Using White–Box Approach to Test design – Test Adequacy Criteria – static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White–box Based Test Design – code complexity testing – Evaluating Test Adequacy Criteria.

UNIT III   LEVELS OF TESTING   9

The Need for Levels of Testing – Unit Test – Unit Test Planning –Designing the Unit Tests. The Test Harness – Running the Unit tests and Recording results – Integration tests – Designing Integration Tests – Integration Test Planning – scenario testing – defect bash elimination -System Testing – types of system testing - Acceptance testing – performance testing - Regression Testing – internationalization testing – ad-hoc testing - Alpha – Beta Tests – testing OO systems – usability and accessibility testing

UNIT IV   TEST MANAGEMENT   9

People and organizational issues in testing – organization structures for testing teams – testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group.

UNIT V   CONTROLLING AND MONITORING   9

Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation - Test metrics and measurements –project, progress and productivity metrics – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans– Reporting Review Results. – evaluating software quality – defect prevention – testing maturity model

                                                            TOTAL = 45 PERIODS

TEXT BOOKS:
1. Srinivasan Desikan and Gopalaswamy Ramesh, " Software Testing – Principles and Practices", Pearson education, 2006.
2. Aditya P.Mathur, "Foundations of Software Testing", Pearson Education,2008.

REFERENCES:
 1. Boris Beizer, "Software Testing Techniques", Second Edition,Dreamtech, 2003.
2. Elfriede Dustin, "Effective Software Testing", First Edition, Pearson Education, 2003.
3. Renu Rajani, Pradeep Oak, "Software Testing – Effective Methods, Tools and Techniques", Tata McGraw Hill, 2004.

IT2033   **BIOINFORMATICS**   **L T P C**
                                                                    3 0 0 3

UNIT I   **9**
Introduction to molecular biology – the genetic material – gene structure – protein structure – chemical bonds – molecular biology tools – genomic information content

UNIT II   **9**
Data searches – simple alignments – gaps – scoring matrices – dynamic programming – global and local alignments – database searches – multiple sequence alignments Patterns for substitutions – estimating substitution numbers – evolutionary rates – molecular clocks – evolution in organelles

UNIT III   **9**
Phylogenetics – history and advantages – phylogenetic trees – distance matrix methods – maximum likelihood approaches – multiple sequence alignments – Parsimony – ancestral sequences – strategies for faster searches – consensus trees – tree confidence – comparison of phylogenetic methods – molecular phylogenies

UNIT IV   **9**
Genomics – prokaryotic genomes: prokaryotic gene structure – GC content - gene density – eukaryotic genomes: gene structure – open reading frames – GC content – gene expression – transposition – repeated elements – gene density

UNIT V   **9**
Amino acids – polypeptide composition – secondary structure – tertiary and quaternary structure – algorithms for modeling protein folding – structure prediction – predicting RNA secondary structures Proteomics – protein classification – experimental techniques – inhibitors and drug design – ligand screening – NMR structures – empirical methods and prediction techniques – post-translational modification prediction

TOTAL = 45 PERIODS

TEXT BOOK:
1. D. E. Krane and M. L. Raymer, "Fundamental concepts of Bioinformatics", Pearson Education, 2003.

REFERENCES:
1. Arthur M. Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005.
2. T. K. Attwood, D. J. Parry-Smith, and S. Phukan, "Introduction to Bioinformatics", Pearson Education, 1999.
3. Vittal R. Srinivas, "Bioinformatics – A Modern Approach", Prentice-Hall of India Pvt. Ltd., 2005.

IT2034   **ADHOC SENSOR NETWORK**   **L T P C**
                                                                        3 0 0 3

UNIT I   ROUTING   **9**
Cellular and Ad hoc wireless networks – Issues of MAC layer and Routing – Proactive, Reactive and Hybrid Routing protocols – Multicast Routing – Tree based and Mesh based protocols – Multicast with Quality of Service Provision.

UNIT II   QUALITY OF SERVICE   9
Real-time traffic support – Issues and challenges in providing QoS – Classification of QoS Solutions – MAC layer classifications – QoS Aware Routing Protocols – Ticket based and Predictive location based Qos Routing Protocols

UNIT III   ENERGY MANAGEMENT AD HOC NETWORKS   9
Need for Energy Management – Classification of Energy Management Schemes – Battery Management and Transmission Power Management Schemes – Network Layer and Data Link Layer Solutions – System power Management schemes

UNIT IV   MESH NETWORKS   9
Necessity for Mesh Networks – MAC enhancements – IEEE 802.11s Architecture – Opportunistic Routing – Self Configuration and Auto Configuration - Capacity Models – Fairness – Heterogeneous Mesh Networks – Vehicular Mesh Networks
UNIT V   SENSOR NETWORKS   9
Introduction – Sensor Network architecture – Data Dissemination – Data Gathering – MAC Protocols for sensor Networks – Location discovery – Quality of Sensor Networks – Evolving Standards – Other Issues – Recent trends in Infrastructure less Networks

TOTAL = 45 PERIODS

TEXT BOOK:
1. C. Siva Ram Murthy and B.S.Manoj, "Ad hoc Wireless Networks – Architectures and Protocols', Pearson Education, 2004

REFERENCES:
1. Feng Zhao and Leonidas Guibas, "Wireless Sensor Networks", Morgan Kaufman Publishers, 2004.
2. C.K.Toh, "Adhoc Mobile Wireless Networks", Pearson Education, 2002.
3. Thomas Krag and Sebastin Buettrich, 'Wireless Mesh Networking', O'Reilly Publishers, 2007.

CS2351   ARTIFICIAL INTELLIGENCE   L T P C
                                                                                    3 0 0 3
AIM
To learn the basics of designing intelligent agents that can solve general purpose problems, represent and process knowledge, plan and act, reason under uncertainty and can learn from experiences

UNIT I   PROBLEM SOLVING   9
Introduction – Agents – Problem formulation – uninformed search strategies – heuristics – informed search strategies – constraint satisfaction

UNIT II   LOGICAL REASONING   9
Logical agents – propositional logic – inferences – first-order logic – inferences in first-order logic – forward chaining – backward chaining – unification – resolution

UNIT III   PLANNING   9

Planning with state-space search – partial-order planning – planning graphs – planning and acting in the real world

UNIT IV   UNCERTAIN KNOWLEDGE AND REASONING   9

Uncertainty – review of probability - probabilistic Reasoning – Bayesian networks – inferences in Bayesian networks – Temporal models – Hidden Markov models

UNIT V   LEARNING   9

Learning from observation - Inductive learning – Decision trees – Explanation based learning – Statistical Learning methods - Reinforcement Learning.

TOTAL = 45 PERIODS

TEXT BOOK:

1. S. Russel and P. Norvig, "Artificial Intelligence – A Modern Approach", Second Edition, Pearson Education, 2003.

REFERENCES:

1. David Poole, Alan Mackworth, Randy Goebel, "Computational Intelligence : a logical approach", Oxford University Press, 2004.
2. G. Luger, "Artificial Intelligence: Structures and Strategies for complex problem solving", Fourth Edition, Pearson Education, 2002.
3. J.Nilsson, "Artificial Intelligence: A new Synthesis", Elsevier Publishers, 1998.

IT2041   ENTERPRISE RESOURCE PLANNING   L T P C
**   3 0 0 3**

UNIT I   ERP AND TECHNOLOGY   10

Introduction – Related Technologies – Business Intelligence – E-Commerce and E-Business – Business Process Reengineering – Data Warehousing – Data Mining – OLAP – Product life Cycle management – SCM – CRM

UNIT II   ERP IMPLEMENTATION   10

Implementation Challenges – Strategies – Life Cycle – Pre-implementation Tasks – Requirements Definition – Methodologies – Package selection – Project Teams – Process Definitions – Vendors and Consultants – Data Migration – Project management – Post Implementation Activities.

UNIT III   ERP IN ACTION & BUSINESS MODULES   8

Operation and Maintenance – Performance – Maximizing the ERP System – Business Modules – Finance – Manufacturing – Human Resources – Plant maintenance – Materials Management – Quality management – Marketing – Sales, Distribution and service.

UNIT IV   ERP MARKET   9

Marketplace – Dynamics – SAP AG – Oracle – PeopleSoft – JD Edwards – QAD Inc – SSA Global – Lawson Software – Epicor – Intutive.

UNIT V   **8**

Enterprise Application Integration – ERP and E-Business – ERP II – Total quality management – Future Directions – Trends in ERP.

TOTAL = 45 PERIODS

TEXT BOOKS:
1. Alexis Leon, "ERP DEMYSTIFIED", Tata McGraw Hill, Second Edition, 2008.
2. Mary Sumner, "Enterprise Resource Planning", Pearson Education, 2007.

REFERENCES:
1. Jim Mazzullo,"SAP R/3 for Everyone", Pearson,2007.
2. Jose Antonio Fernandz, " The SAP R /3 Handbook", Tata McGraw Hill, 1998.
3. Biao Fu, "SAP BW: A Step-by-Step Guide", First Edition, Pearson Education, 2003.

IT2042   **INFORMATION SECURITY**   **L T P C**
                                                                                3 0 0 3

AIM
To study the critical need for ensuring Information Security in Organizations

OBJECTIVES
- To understand the basics of Information Security
- To know the legal, ethical and professional issues in Information Security
- To know the aspects of risk management
- To become aware of various standards in this area
- To know the technological aspects of Information Security

UNIT I   **INTRODUCTION**   **9**

History, What is Information Security ?, Critical Characteristics of Information, NSTISSC Security Model, Components of an Information System, Securing the Components, Balancing Security and Access, The SDLC, The Security SDLC

UNIT II   **SECURITY INVESTIGATION**   **9**

Need for Security, Business Needs, Threats, Attacks, Legal, Ethical and Professional Issues

UNIT III   **SECURITY ANALYSIS**   **9**

Risk Management : Identifying and Assessing Risk, Assessing and Controlling Risk

UNIT IV   **LOGICAL DESIGN**   **9**

Blueprint for Security, Information Security Poicy, Standards and Practices, ISO 17799/BS 7799, NIST Models, VISA International Security Model, Design of Security Architecture, Planning for Continuity

UNIT V   **PHYSICAL DESIGN**   **9**

Security Technology, IDS, Scanning and Analysis Tools, Cryptography, Access Control Devices, Physical Security, Security and Personnel

TOTAL = 45 PERIODS

TEXT BOOK:
1. Michael E Whitman and Herbert J Mattord, "Principles of Information Security", Vikas Publishing House, New Delhi, 2003

REFERENCES:
1. Micki Krause, Harold F. Tipton, " Handbook of Information Security Management", Vol 1-3 CRC Press LLC, 2004.
2. Stuart Mc Clure, Joel Scrambray, George Kurtz, "Hacking Exposed", Tata McGraw-Hill, 2003
3. Matt Bishop, " Computer Security Art and Science", Pearson/PHI, 2002.

IT2043	KNOWLEDGE MANAGEMENT	L T P C
		3 0 0 3

UNIT I   KNOWLEDGE MANAGEMENT   9
KM Myths – KM Life Cycle – Understanding Knowledge – Knowledge, intelligence – Experience – Common Sense – Cognition and KM – Types of Knowledge – Expert Knowledge – Human Thinking and Learning.

UNIT II   KNOWLEDGE MANAGEMENT SYSTEM LIFE CYCLE   9
Challenges in Building KM Systems – Conventional Vrs KM System Life Cycle (KMSLS) – Knowledge Creation and Knowledge Architecture – Nonaka's Model of Knowledge Creation and Transformation. Knowledge Architecture.

UNIT III   CAPTURING KNOWLEDGE   9
Evaluating the Expert – Developing a Relationship with Experts – Fuzzy Reasoning and the Quality of Knowledge – Knowledge Capturing Techniques, Brain Storming – Protocol Analysis – Consensus Decision Making – Repertory Grid- Concept Mapping – Blackboarding.

UNIT IV   KNOWLEDGE CODIFICATION   9
Modes of Knowledge Conversion – Codification Tools and Procedures – Knowledge Developer's Skill Sets – System Testing and Deployment – Knowledge Testing – Approaches to Logical Testing, User Acceptance Testing – KM System Deployment Issues – User Training – Post implementation.

UNIT V   KNOWLEDGE TRANSFER AND SHARING   9
Transfer Methods – Role of the Internet – Knowledge Transfer in e-world – KM System Tools – Neural Network – Association Rules – Classification Trees – Data Mining and Business Intelligence – Decision Making Architecture – Data Management – Knowledge Management Protocols – Managing Knowledge Workers.

                                        TOTAL = 45 PERIODS

TEXT BOOK:
1. Elias.M. Award & Hassan M. Ghaziri – "Knowledge Management" Pearson Education 2003.

REFERENCES:
1. Guus Schreiber, Hans Akkermans, Anjo Anjewierden, Robert de Hoog, Nigel Shadbolt, Walter Van de Velde and Bob Wielinga, "Knowledge Engineering and Management", Universities Press, 2001.
2. C.W. Holsapple, "Handbooks on Knowledge Management", International Handbooks on Information Systems, Vol 1 and 2, 2003

CS2063   **GRID COMPUTING**   **L T P C**
                                                                3 0 0 3

UNIT I   **CONCEPTS AND ARCHITECTURE**   **9**
Introduction-Parallel and Distributed Computing-Cluster Computing-Grid Computing-Anatomy and Physiology of Grid-Review of Web Services-OGSA-WSRF.

UNIT II   **GRID MONITORING**   **9**
Grid Monitoring Architecture (GMA) - An Overview of Grid Monitoring Systems- GridICE – JAMM -MDS-Network Weather Service-R-GMA-Other Monitoring Systems-Ganglia and GridMon

UNIT III   **GRID SECURITY AND RESOURCE MANAGEMENT**   **9**
Grid Security-A Brief Security Primer-PKI-X509 Certificates-Grid Security-Grid Scheduling and Resource Management-Scheduling Paradigms- Working principles of Scheduling -A Review of Condor, SGE, PBS and LSF-Grid Scheduling with QoS.

UNIT IV   **DATA MANAGEMENT AND GRID PORTALS**   **9**
Data Management-Categories and Origins of Structured Data-Data Management Challenges-Architectural Approaches-Collective Data Management Services-Federation Services-Grid Portals-First-Generation Grid Portals-Second-Generation Grid Portals.

UNIT V   **GRID MIDDLEWARE**   **9**
List of globally available Middlewares - Case Studies-Recent version of Globus Toolkit and GLite - Architecture, Components and Features.
                                              TOTAL = 45 PERIODS

TEXT BOOK:
1. Maozhen Li, Mark Baker, The Grid Core Technologies, John Wiley & Sons ,2005.

REFERENCES:
1. Ian Foster & Carl Kesselman,The Grid 2 – Blueprint for a New Computing Infrascture Morgan Kaufman – 2004.
2. Joshy Joseph & Craig Fellenstein, "Grid Computing", Pearson Education 2004.
3. Fran Berman,Geoffrey Fox, Anthony J.G.Hey, "Grid Computing: Making the Global Infrastructure a reality", John Wiley and sons, 2003.

CS2041   **C# AND .NET FRAMEWORK**   **L T P C**
                                                                3 0 0 3

UNIT I   **9**
Review of OOP Concepts - Overview of .NET Framework - Basic Elements of C# - Program Structure and simple Input and Output Operations – Operators and Expressions – Statements – Arrays and Structures.

UNIT II   **9**
Inheritance - Namespace – Polymorphism – Interface and Overloading – Multiple Inheritance – Property – Indexes – Delegates – Publish/Subscribe Design Patterns-Operator Overloading-Method Overloading

UNIT III   **9**

C# Concepts for creating Data Structures - File Operation – File Management systems – Stream Oriented Operations- Multitasking – Multithreading – Thread Operation – Synchronization.

UNIT IV   **9**

Working with XML – Techniques for Reading and Writing XML Data - Using XPath and Search XML - ADO.NET Architecture – ADO.NET Connected and Disconnected Models – XML and ADO.NET – Simple and Complex Data Binding– Data Grid View Class.

UNIT V   **9**

Application Domains – Remoting – Leasing and Sponsorship - .NET Coding Design Guidelines –Assemblies – Security – Application Development – Web Services - Building an XML Web Service - Web Service Client – WSDL and SOAP – Web Service with Complex Data Types – Web Service Performance.

TOTAL = 45 PERIODS

TEXT BOOKS:
1. S. Thamarai Selvi and R. Murugesan "A Textbook on C# ", Pearson Education,2003.
2. Stephen C. Perry " Core C# and .NET", Pearson Education,2006.

REFERENCES:
1. Jesse Liberty, "Programming C#", Second Edition, O'Reilly Press, 2002.
2. Robinson et al, "Professional C#", Fifth Edition, Wrox Press, 2002.
3. Herbert Schildt, "The Complete Reference: C#", Tata McGraw Hill, 2004.
4. Andrew Troelsen, "C# and the .NET Platform", A! Press, 2003.
5. Thuan Thai and Hoang Q. Lam, ". NET Framework Essentials", Second Edition, O'Reilly, 2002.

IT2050   **PRINCIPLES OF COMPILER DESIGN**   **L T P C**
                                                                          3 0 0 3

UNIT I   **BASICS OF COMPILATION**   **9**

Compilers – Analysis of source program – Phases of a compiler – Grouping of phases – Compiler Construction tools – Lexical Analyzer: Token specification -Token Recognition- A language for Specifying lexical analyzer– Top down parser : Table implementation of Predictive Parser - Bottom-up Parser : SLR(1) Parser - Parser generators.

UNIT II   **TYPE CHECKING AND RUNTIME ENVIRONMENTS**   **9**

Syntax directed definitions – Construction of syntax trees – Type systems – Specification of a simple type checker - Equivalence of type expressions – Type conversions – Attribute grammar for a simple type checking system – Runtime Environments: Source language issues – Storage organization – Storage allocation strategies – Parameter passing.

UNIT III   **INTERMEDIATE CODE GENERATION**   **9**

Intermediate languages – Declarations – Assignment statements – Boolean expressions – Case statements – Backpatching – Procedure calls.

UNIT IV   CODE GENERATION   9
Issues in the design of a code generator – The target machine – Runtime storage management – Basic blocks and flow graphs – Next-use information – A simple code generator – Register allocation and assignment – The DAG representation of basic blocks – Generating code from DAG – Dynamic programming code generation algorithm – Code-generator generators.

UNIT V   CODE OPTIMIZATION   9
Principal sources of optimization – Peephole optimization – Optimization of basic blocks – Loops in flow graphs – Introduction to global data flow analysis – Iterative solution of data flow equations – Code improving transformations – Dealing with aliases.

                                                                TOTAL = 45 PERIODS

TEXT BOOK:
1. Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman. "Compilers Principles, Techniques and Tools". Pearson Education, 2008.

REFERENCES:
1. Steven S. Muchnick, "Advanced Compiler Design Implementation", Morgan Koffman, 1997.
2. Charles N. Fischer, Richard J. Leblanc, "Crafting a Compiler with C", Benjamin Cummings, 1991.
3. Allen Holub, "Compiler Design in C", Prentice Hall of India, 1990.

IT2051   KNOWLEDGE ENGINEERING   L T P C
                                                                         3 0 0 3
UNIT I   INTRODUCTION   9
Key concepts – Why knowledge Representation and Reasoning – Language of first order Logic – Syntax, Semantics Pragmatics – Expressing Knowledge – Levels of Representation – Knowledge Acquisition and Sharing – Sharing Ontologies – Language Ontologies –Language Patterns – Tools for Knowledge Acquisition

UNIT II   RESOLUTION AND REASONING   9
Proportional Case – Handling Variables and Qualifies – Dealing with Intractability – Reasoning with Horn Clauses - Procedural Control of Reasoning – Rules in Production – Description Logic - Vivid Knowledge – Beyond Vivid.

UNIT III   REPRESENTATION   9
Object Oriented Representations – Frame Formalism – Structured Descriptions – Meaning and Entailment - Taxonomies and Classification – Inheritance – Networks – Strategies for Defeasible Inheritance – Formal Account of Inheritance Networks.

UNIT IV   DEFAULTS, UNCERTAINTY AND EXPRESSIVENESS   9
Defaults – Introduction – Closed World Reasoning – Circumscription – Default Logic Limitations of Logic – Fuzzy Logic – Nonmontonic Logic – Theories and World – Semiotics – Auto epistemic Logic - Vagueness – Uncertainty and Degrees of Belief – Noncategorical Reasoning – Objective and Subjective Probability.

UNIT V   ACTIONS AND PLANNING   9

Explanation and Diagnosis – Purpose – Syntax, Semantics of Context – First Order Reasoning – Modal Reasoning in Context – Encapsulating Objects in Context – Agents – Actions – Situational Calculus – Frame Problem – Complex Actions – Planning – Strips – Planning as Reasoning – Hierarchical and Conditional Planning.

TOTAL = 45 PERIODS

TEXT BOOK:

1. Ronald Brachman, Hector Levesque "Knowledge Representation and Reasoning ", The Morgan Kaufmann Series in Artificial Intelligence 2004

REFERENCES:

1. John F. Sowa, " Knowledge Representation: Logical, Philosophical, and Computational Foundations", 2000
2. Arthur B. Markman, "Knowledge Representation", Lawrence Erlbaum Associates,1998

GE2021   **PROFESSIONAL ETHICS IN ENGINEERING**   **L T P C**
                                                           3 0 0 3

UNIT I   ENGINEERING ETHICS   9

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories

UNIT II   ENGINEERING AS SOCIAL EXPERIMENTATION   9

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study

UNIT III   ENGINEER'S RESPONSIBILITY FOR SAFETY   9

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Chernobyl Case Studies and Bhopal

UNIT IV   RESPONSIBILITIES AND RIGHTS   9

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) - Discrimination

UNIT V   GLOBAL ISSUES   9

Multinational Corporations – Business Ethics - Environmental Ethics – Computer Ethics - Role in Technological Development – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

TOTAL = 45 PERIODS

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw Hill, New York, 2005.
2. Charles E Harris, Michael S Pritchard and Michael J Rabins, "Engineering Ethics – Concepts and Cases", Thompson Learning, 2000.

REFERENCES:
1. Charles D Fleddermann, "Engineering Ethics", Prentice Hall, New Mexico, 1999.
2. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, 2003
3. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, 2001.
4. Prof. (Col) P S Bajaj and Dr. Raj Agrawal, "Business Ethics – An Indian Perspective", Biztantra, New Delhi, 2004.
5. David Ermann and Michele S Shauf, "Computers, Ethics and Society", Oxford University Press, (2003)

GE2071   **INTELLECTUAL PROPERTY RIGHTS (IPR)**   **L T P C**
                                                                      3 0 0 3

UNIT I   9
Introduction – Invention and Creativity – Intellectual Property (IP) – Importance – Protection of IPR – Basic types of property (i). Movable Property - Immovable Property and - Intellectual Property.

UNIT II   9
IP – Patents – Copyrights and related rights – Trade Marks and rights arising from Trademark registration – Definitions – Industrial Designs and Integrated circuits – Protection of Geographical Indications at national and International levels – Application Procedures..

UNIT III   9
International convention relating to Intellectual Property – Establishment of WIPO – Mission and Activities – History – General Agreement on Trade and Tariff (GATT) – TRIPS Agreement.

UNIT IV   9
Indian Position Vs WTO and Strategies – Indian IPR legislations – commitments to WTO-Patent Ordinance and the Bill – Draft of a national Intellectual Property Policy – Present against unfair competition.

UNIT V   9
Case Studies on – Patents (Basumati rice, turmeric, Neem, etc.) – Copyright and related rights – Trade Marks – Industrial design and Integrated circuits – Geographic indications – Protection against unfair competition.

TOTAL = 45 PERIODS

TEXT BOOK:
1. Subbaram N.R. "Handbook of Indian Patent Law and Practice ", S. Viswanathan Printers and Publishers Pvt. Ltd., 1998.

REFERENCES:
1. Eli Whitney, United States Patent Number: 72X, Cotton Gin, March 14, 1794.
2. Intellectual Property Today: Volume 8, No. 5, May 2001, [www.iptoday.com].
3. Using the Internet for non-patent prior art searches, Derwent IP Matters, July 2000. www.ipmatters.net/features/000707_gibbs.html.

IT2052   **MANAGEMENT INFORMATION SYSTEM**   **L T P C**
                                                                       3 0 0 3

UNIT I   INFORMATION SYSTEM AND ORGANIZATION   9
Matching the Information System Plan to the Organizational Strategic Plan – Identifying Key Organizational Objective and Processes and Developing an Information System Development – User role in Systems Development Process – Maintainability and Recoverability in System Design.

UNIT II   REPRESENTATION AND ANALYSIS OF SYSTEM STRUCTURE   9
Models for Representing Systems: Mathematical, Graphical and Hierarchical (Organization Chart, Tree Diagram) – Information Flow – Process Flow – Methods and Heuristics – Decomposition and Aggregation – Information Architecture – Application of System Representation to Case Studies.

UNIT III   SYSTEMS, INFORMATION AND DECISION THEORY   9
Information Theory – Information Content and Redundancy – Classification and Compression – Summarizing and Filtering – Inferences and Uncertainty – Identifying Information needed to Support Decision Making – Human Factors – Problem characteristics and Information System Capabilities in Decision Making.

UNIT IV   INFORMATION SYSTEM APPLICATION   9
Transaction Processing Applications – Basic Accounting Application – Applications for Budgeting and Planning – Other use of Information Technology: Automation – Word Processing – Electronic Mail – Evaluation Remote Conferencing and Graphics – System and Selection – Cost Benefit – Centralized versus Decentralized Allocation Mechanism.

UNIT V   DEVELOPMENT AND MAINTENANCE OF INFORMATION SYSTEMS 9
Systems analysis and design – System development life cycle – Limitation – End User Development – Managing End Users – off– the shelf software packages – Outsourcing – Comparison of different methodologies.

                                                       TOTAL = 45 PERIODS

TEXT BOOK:
1. Laudon K.C, Laudon J.P, Brabston M.E, "Management Information Systems - Managing the digital firm", Pearon Education, 2004.

REFERENCES:
1. Turban E.F, Potter R.E, "Introduction to Information Technology"; Wiley, 2 004.
2. Jeffrey A.Hoffer, Joey F.George, Joseph S. Valachich, "Modern Systems Analysis and Design", Third Edition, Prentice Hall, 2002.

IT2053   **SOFTWARE DESIGN**   **L T P C**
                                                                       3 0 0 3
UNIT I   GENERAL DESIGN FUNDAMENTALS   9
The nature of Design process – Objectives – Building Models – Constructs, Design qualities – Assessing the design – Design viewpoints for software – The object Model – Classes and Objects – Complexity – Classification – Notation – Process – Pragmatics.

UNIT II   STRUCTURED SYSTEM ANALYSIS AND DESIGN   9

Structured Design – Design Principles – Problem Partitioning and Hierarchy – Abstraction, Modularity – Top-down and Bottom-up Strategies – Transformation of a DFD to a Structure Chart – Transform Analysis – Transaction Analysis – Coupling – Cohesion – Multiple types of Cohesion in a module – Data Design – Normalization – Denormalization – Procedural Design.

UNIT III   OBJECT ORIENTED ANALYSIS AND DESIGN   9

Overview of Object Oriented Analysis – Shaler/Mellor – Coad/ Yourdon – Rumbaugh – Booch – UML – Use case – Conceptual model – Behaviour – Class Analysis Patterns – Overview – Diagrams – Aggregation – UML – Diagrams – Collaboration – Sequence – Class – Design patterns and Frameworks – Comparison with other design methods – Managing analysis and design – Evaluation testing – Coding – Maintenance – Metrics.

UNIT IV   SOFTWARE DESIGN   9

The Architecture Concepts – Design Methods – Design Patterns – Rationale for Methods – Design Processes and Strategies – Design by Template – Designing with Patterns – Stepwise Refinement – Incremental Design – Prototyping – DSDM – Structured Systems Analysis and Structured Design – JSP – JSD.

UNIT V   CASE STUDIES   9

Domain Name System – Email – World Wide Web (HTTP) – Simple Network Management Protocol – File Transfer Protocol – Security – Mutimedia applications.

TOTAL = 45 PERIODS

REFERENCES:
1. David Budgen, "Software Design", Second Edition, Pearson Education, 2004.
2. R. S. Pressman, "Software Engineering", Fifth Edition, McGraw Hill Inc., 2001.
3. Steve McConnell, "Code Complete ", Word Power Publishers, 2001.
4. Ed Downs, Peter Clare, Jan Coe, "Structured System Analysis and Design Methods Application and Context ", Prentice Hall, 1998.
5. A. G. Suteliffe, "Human Computer Interface Design ", Second Edition Macmillan, 1995.

CS2053   SOFT COMPUTING   L T P C
**   3 0 0 3**

UNIT I   FUZZY SET THEORY   10

Introduction to Neuro – Fuzzy and Soft Computing – Fuzzy Sets – Basic Definition and Terminology – Set-theoretic Operations – Member Function Formulation and Parameterization – Fuzzy Rules and Fuzzy Reasoning – Extension Principle and Fuzzy Relations – Fuzzy If-Then Rules – Fuzzy Reasoning – Fuzzy Inference Systems – Mamdani Fuzzy Models – Sugeno Fuzzy Models – Tsukamoto Fuzzy Models – Input Space Partitioning and Fuzzy Modeling.

UNIT II   OPTIMIZATION   8

Derivative-based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT III ARTIFICIAL INTELLIGENCE 10

Introduction, Knowledge Representation – Reasoning, Issues and Acquisition: Prepositional and Predicate Calculus Rule Based knowledge Representation Symbolic Reasoning Under Uncertainity Basic knowledge Representation Issues Knowledge acquisition – Heuristic Search: Techniques for Heuristic search Heuristic Classification - State Space Search: Strategies Implementation of Graph Search Search based on Recursion Patent-directed Search Production System and Learning.

UNIT IV NEURO FUZZY MODELING 9

Adaptive Neuro-Fuzzy Inference Systems – Architecture – Hybrid Learning Algorithm – Learning Methods that Cross-fertilize ANFIS and RBFN – Coactive Neuro Fuzzy Modeling – Framework Neuron Functions for Adaptive Networks – Neuro Fuzzy Spectrum.

UNIT V APPLICATIONS OF COMPUTATIONAL INTELLIGENCE 8

Printed Character Recognition – Inverse Kinematics Problems – Automobile Fuel Efficiency Prediction – Soft Computing for Color Recipe Prediction.

TOTAL = 45 PERIODS

TEXT BOOKS:
1. J.S.R.Jang, C.T.Sun and E.Mizutani, "Neuro-Fuzzy and Soft Computing", PHI, 2004, Pearson Education 2004.
2. N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford University Press, 2006.

REFERENCES:
1. Elaine Rich & Kevin Knight, Artificial Intelligence, Second Edition, Tata Mcgraw Hill Publishing Comp., 2006, New Delhi.
2. Timothy J.Ross, "Fuzzy Logic with Engineering Applications", McGraw-Hill, 1997.
3. Davis E.Goldberg, "Genetic Algorithms: Search, Optimization and Machine Learning", Addison Wesley, N.Y., 1989.
4. S. Rajasekaran and G.A.V.Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, 2003.
5. R.Eberhart, P.Simpson and R.Dobbins, "Computational Intelligence - PC Tools", AP Professional, Boston, 1996.
6. Amit Konar, "Artificial Intelligence and Soft Computing Behaviour and Cognitive model of the human brain", CRC Press, 2008.

GE2022 **TOTAL QUALITY MANAGEMENT** **L T P C**
3 0 0 3

UNIT I INTRODUCTION 9

Introduction - Need for quality - Evolution of quality - Definition of quality - Dimensions of manufacturing and service quality - Basic concepts of TQM - Definition of TQM – TQM Framework - Contributions of Deming, Juran and Crosby – Barriers to TQM.

UNIT II TQM PRINCIPLES 9

Leadership – Strategic quality planning, Quality statements - Customer focus – Customer orientation, Customer satisfaction, Customer complaints, Customer retention - Employee involvement – Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement – PDSA cycle, 5s, Kaizen - Supplier partnership – Partnering, Supplier selection, Supplier Rating.

UNIT III   TQM TOOLS & TECHNIQUES I   9
The seven traditional tools of quality – New management tools – Six-sigma: Concepts, methodology, applications to manufacturing, service sector including IT – Bench marking – Reason to bench mark, Bench marking process – FMEA – Stages, Types.

UNIT IV   TQM TOOLS & TECHNIQUES II   9
Quality circles – Quality Function Deployment (QFD) – Taguchi quality loss function – TPM – Concepts, improvement needs – Cost of Quality – Performance measures.

UNIT V   QUALITY SYSTEMS   9
Need for ISO 9000- ISO 9000-2000 Quality System – Elements, Documentation, Quality auditing- QS 9000 – ISO 14000 – Concepts, Requirements and Benefits – Case studies of TQM implementation in manufacturing and service sectors including IT.

TOTAL = 45 PERIODS

TEXT BOOK:
1. Dale H.Besterfiled, et at., "Total Quality Management", Pearson Education Asia,   3rd Edition, Indian Reprint (2006).

REFERENCES:
1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 6th Edition, South-Western (Thomson Learning), 2005.
2. Oakland, J.S., "TQM – Text with Cases", Butterworth – Heinemann Ltd., Oxford, 3rd Edition, 2003.
3. Suganthi,L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd.,2006.
4. Janakiraman, B and Gopal, R.K, "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.

**GE2072   INDIAN CONSTITUTION AND SOCIETY   L T P C
                                                          3 0 0 3**

UNIT I   9
Historical Background – Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.

UNIT II   9
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.

UNIT III   9
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.

UNIT IV   **9**
Indian Federal System – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.

UNIT V   **9**
Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.

TOTAL: 45 PERIODS

TEXT BOOKS:
1. Durga Das Basu, " Introduction to the Constitution of India ", Prentice Hall of India, New Delhi.
2. R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
3. Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
4. K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

REFERENCES:
1. Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2. U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar.
3. R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.

IT2061   **SYSTEM MODELING AND SIMULATION**   **L T P C**
                                                                                            3 0 0 3
UNIT I   INTRODUCTION TO SIMULATION   **9**
Introduction – Simulation Terminologies- Application areas – Model Classification – Types of Simulation- Steps in a Simulation study- Concepts in Discrete Event Simulation - Simulation Examples

UNIT II   MATHEMATICAL MODELS   **9**
Statistical Models - Concepts – Discrete Distribution- Continuous Distribution – Poisson Process- Empirical Distributions- Queueing Models – Characteristics- Notation – Queueing Systems – Markovian Models- Properties of random numbers- Generation of Pseudo Random numbers- Techniques for generating random numbers-Testing random number generators- Generating Random-Variates- Inverse Transform technique – Acceptance- Rejection technique – Composition & Convolution Method.

UNIT III   ANALYSIS OF SIMULATION DATA   **9**
Input Modeling - Data collection - Assessing sample independence - Hypothesizing distribution family with data - Parameter Estimation - Goodness-of-fit tests - Selecting input models in absence of data- Output analysis for a Single system – Terminating Simulations – Steady state simulations.

UNIT IV   **VERIFICATION AND VALIDATION**   **9**

Model Building – Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

UNIT V   **SIMULATION OF COMPUTER SYSTEMS AND CASE STUDIES**   **9**

Simulation Tools – Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models.

                                         TOTAL = 45 PERIODS

TEXT BOOKS:

1. Jerry Banks and John Carson, " Discrete Event System Simulation", Fourth Edition, PHI, 2005.
2. Geoffrey Gordon, "System Simulation", Second Edition, PHI, 2006 (Unit – V).

REFERENCES:

1. Frank L. Severance, " System Modeling and Simulation", Wiley, 2001.
2. Averill M. Law and W.David Kelton, " Simulation Modeling and Analysis, Third Edition, McGraw Hill, 2006.
3. Jerry Banks, "Handbook of Simulation: Principles, Methodology, Advances, Applications and Practice", Wiley, 1998.

CS2035   **NATURAL LANGUAGE PROCESSING**   **L T P C**
                                                             3 0 0 3

UNIT I   **9**

Introduction – Models -and Algorithms - The Turing Test -Regular Expressions
Basic Regular Expression Patterns -Finite State Automata -Regular Languages and FSAs – Morphology -Inflectional Morphology - Derivational Morphology -Finite-State Morphological Parsing - Combining an FST Lexicon and Rules -Porter Stemmer

UNIT II   **9**

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing-Backoff - Deleted Interpolation – Entropy - English Word Classes - Tagsets for English - Part of Speech Tagging -Rule-Based Part of Speech Tagging - Stochastic Part of Speech Tagging - Transformation-Based Tagging -

UNIT III   **9**

Context Free Grammars for English Syntax- Context-Free Rules and Trees - Sentence-Level Constructions –Agreement – Sub Categorization – Parsing – Top-down – Earley Parsing -Feature Structures - Probabilistic Context-Free Grammars

UNIT IV   **9**

Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus - Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis - Semantic Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and Their Senses - Internal Structure - Word Sense Disambiguation -Information Retrieval

UNIT V   **9**

Discourse -Reference Resolution - Text Coherence -Discourse Structure - Dialog and Conversational Agents - Dialog Acts – Interpretation – Coherence -Conversational Agents - Language Generation – Architecture -Surface Realizations - Discourse Planning – Machine Translation -Transfer Metaphor – Interlingua – Statistical Approaches

TOTAL = 45 PERIODS

TEXT BOOKS:
1. D. Jurafsky and J. Martin "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition",
2. C. Manning and H. Schutze, "Foundations of Statistical Natural Language Processing",

REFERENCE:
1. James Allen. "Natural Language Understanding", Addison Wesley, 1994.

CS2056   **DISTRIBUTED SYSTEMS**   **L T P C**
                                                        3 0 0 3

UNIT I   **9**

Characterization of Distributed Systems-Introduction-Examples-Resource Sharing and the Web-Challenges. System Models-Architectural-Fundamental.
Interprocess Communication-Introduction-API for Internet protocols-External data representation and marshalling--Client-server communication-Group communication-Case study: Interprocess Communication in UNIX.

UNIT II   **9**

Distributed Objects and Remote Invocation-Introduction-Communication between distributed objects-Remote procedure calls-Events and notifications-Case study: Java RMI. Operating System Support-Introduction-OS layer-Protection-Processes and threads-Communication and invocation OS architecture.

UNIT III   **9**

Distributed File Systems-Introduction-File service architecture-Case Study:Sun Network File System-Enhancements and further developments.
Name Services-Introduction-Name Services and the Domain Name System-Directory Services-Case Study: Global Name Service.

UNIT IV   **9**

Time and Global States-Introduction-Clocks, events and process states-Synchronizing physical clocks-Logical time and logical clocks-Global states-Distributed debugging.
Coordination and Agreement-Introduction-Distributed mutual exclusion-Elections-Multicast communication-Consensus and related problems.

UNIT V   **9**

Distributed Shared Memory-Introduction-Design and implementation issues-Sequential consistency and Ivy case study Release consistency and Munin case study-Other consistency models.CORBA Case Study- Introduction-CORBA RMI-CORBA services.

TOTAL = 45 PERIODS

TEXT BOOK:

1. George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.

REFERENCES:

1. A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2. M.L.Liu, "Distributed Computing Principles and Applications", Pearson Addison Wesley, 2004.
3. Mukesh Singhal, "Advanced Concepts In Operating Systems", McGrawHill Series in Computer Science, 1994.
4. Nancy A. Lynch, "Distributed Algorithms", The Morgan Kaufmann Series in Data Management System, Morgan Kaufmann Publishers, 2000.

GE2023	FUNDAMENTALS OF NANOSCIENCE	L T P C
		3 0 0 3

UNIT I   INTRODUCTION   9

Nanoscale Science and Technology- Implications for Physics, Chemistry, Biology and Engineering-Classifications of nanostructured materials- nano particles- quantum dots, nanowires-ultra-thinfilms-multilayered materials. Length Scales involved and effect on properties: Mechanical, Electronic, Optical, Magnetic and Thermal properties. Introduction to properties and motivation for study (qualitative only).

UNIT II   PREPARATION METHODS   10

Bottom-up Synthesis-Top-down Approach: Precipitation, Mechanical Milling, Colloidal routes, Self-assembly, Vapour phase deposition, MOCVD, Sputtering, Evaporation, Molecular Beam Epitaxy, Atomic Layer Epitaxy, MOMBE.

UNIT III   PATTERNING AND LITHOGRAPHY FOR NANOSCALE DEVICES   7

Introduction to optical/UV electron beam and X-ray Lithography systems and processes, Wet etching, dry (Plasma /reactive ion) etching, Etch resists-dip pen lithography

UNIT IV   PREPARATION ENVIRONMENTS   9

Clean rooms: specifications and design, air and water purity, requirements for particular processes, Vibration free environments: Services and facilities required. Working practices, sample cleaning, Chemical purification, chemical and biological contamination, Safety issues, flammable and toxic hazards, biohazards.

UNIT V   CHARECTERISATION TECHNIQUES   10

X-ray diffraction technique, Scanning Electron Microscopy - environmental techniques, Transmission Electron Microscopy including high-resolution imaging, Surface Analysis techniques- AFM, SPM, STM, SNOM, ESCA, SIMS-Nanoindentation

TOTAL = 45 PERIODS

TEXT BOOKS:

1. A.S. Edelstein and R.C. Cammearata, eds., Nanomaterials: Synthesis, Properties and Applications, (Institute of Physics Publishing, Bristol and Philadelphia, 1996)
2. N John Dinardo, Nanoscale charecterisation of surfaces & Interfaces, Second edition, Weinheim Cambridge, Wiley-VCH, 2000

REFERENCES:
1. G Timp (Editor), Nanotechnology, AIP press/Springer, 1999
2. Akhlesh Lakhtakia (Editor) The Hand Book of Nano Technology, "Nanometer Structure", Theory, Modeling and Simulations. Prentice-Hall of India (P) Ltd, New Delhi, 2007.

IT2064   **SPEECH SIGNAL PROCESSING**   **L T P C**
                                                          3 0 0 3

UNIT I   MECHANICS OF SPEECH   9

Speech production: Mechanism of speech production, Acoustic phonetics - Digital models for speech signals - Representations of speech waveform: Sampling speech signals, basics of quantization, delta modulation, and Differential PCM - Auditory perception: psycho acoustics.

UNIT II   TIME DOMAIN METHODS FOR SPEECH PROCESSING   9

Time domain parameters of Speech signal – Methods for extracting the parameters Energy, Average Magnitude, Zero crossing Rate – Silence Discrimination using ZCR and energy – Short Time Auto Correlation Function – Pitch period estimation using Auto Correlation Function.

UNIT III   FREQUENCY DOMAIN METHOD FOR SPEECH PROCESSING   9

Short Time Fourier analysis: Fourier transform and linear filtering interpretations, Sampling rates - Spectrographic displays - Pitch and formant extraction - Analysis by Synthesis - Analysis synthesis systems: Phase vocoder, Channel Vocoder - Homomorphic speech analysis: Cepstral analysis of Speech, Formant and Pitch Estimation, Homomorphic Vocoders.

UNIT IV   LINEAR PREDICTIVE ANALYSIS OF SPEECH   9

Basic Principles of linear predictive analysis – Auto correlation method – Covariance method – Solution of LPC equations – Cholesky method – Durbin's Recursive algorithm – Application of LPC parameters – Pitch detection using LPC parameters – Formant analysis – VELP – CELP.

UNIT V   APPLICATION OF SPEECH & AUDIO SIGNAL PROCESSING   9

Algorithms: Dynamic time warping, K-means clustering and Vector quantization, Gaussian mixture modeling, hidden Markov modeling - Automatic Speech Recognition: Feature Extraction for ASR, Deterministic sequence recognition, Statistical Sequence recognition, Language models - Speaker identification and verification – Voice response system – Speech synthesis: basics of articulatory, source-filter, and concatenative synthesis – VOIP

                                                          TOTAL = 45 PERIODS

TEXT BOOKS:
1. L. R. Rabiner and R. W. Schaffer, "Digital Processing of Speech signals", Prentice Hall, 1978.
2. Ben Gold and Nelson Morgan, "Speech and Audio Signal Processing", John Wiley and Sons Inc., Singapore, 2004.

REFERENCES:
1. Quatieri, "Discrete-time Speech Signal Processing", Prentice Hall, 2001.
2. L.R. Rabiner and B. H. Juang, "Fundamentals of speech recognition", Prentice Hall, 1993.